Description

<u>Method for implementing a call back service in a mobile radio network</u>

Technical field of the invention

Systems for mobile communication have increasingly gained in importance in recent years. Their spread is aided by the introduction of standards such as GSM (Global System for Mobile Communication) and in the meantime, it has also become possible to communicate outside the borders of one's own country and network operator.

If a telephone call originates in a foreign country, the network operator of the visited network (VPLMN) currently usually earns 70% of the fees paid by the network subscriber whereas the operator of the home network (HPLMN) only receives 30%.

Prior Art

The customer of telecommunication networks and especially the mobile radio networks is already being offered a multiplicity of telecommunication services. To be able to offer new services rapidly and independently of manufacture and network operator if possible, including the existing infrastructure, the concept of the Intelligent Network has been developed. A standardized concept which defines the IN architecture has been worked out in the ITU (see Standards Q.1200 ff).

In a further development, CAMEL (Customized Application for Mobile Network Enhanced Logic, see also GSM 02.78) was developed in which IN features were introduced into the GSM architecture. CAMEL simplifies roaming

both internationally and between networks of different operators and creates a uniform protocol for accessing CAMEL servers in other GSM networks.

5   It is an object of the invention to specify a solution to the abovementioned problem in international or inter-provider roaming.

It is another object of the invention to implement a
10   call back service in a mobile radio network.

Description of the invention

This object is achieved by a method according to Claim
15   1.

The call back service for roaming mobile radio subscribers according to the invention allows PLMN operators to use the advantages of a call back service.
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The call back service UCB (USSD Call Back Service) provides the desired functions:

- Analysis of an incoming USSD string,
25   - Analysis of A party and B party,
- Call set-up to the A party,
- Call set-up to the B party.

The IN service UCB is triggered by means of a USSD
30   string from the visited network VPLMN. If the roaming subscriber is not an IN customer, the HLR forwards the USSD string to a standard SCP which supports UCB; if he is an IN customer, the correct SCP address is located in the CAMEL Subscriber Information CSI.

Using a call back service, the ratio of fees can be reversed in favor of the HPLMN operator of the home network: since the call is set up by the HPLMN, the HPLMN operator now receives the greater proportion of

5 the fees.

Advantageous embodiments and further developments are specified in the subclaims.

10 The interworking of the novel USSD Call back Service UCB with other IN services will also be described. The special feature is that UCB enables roaming subscribers to telephone via IN even if the visited network (VPLMN) does not support the CAMEL protocol.

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The UCB service is thus available to roaming IN customers who can use their subscribed service even without CAMEL. I.e., roaming subscribers use CAMEL in VPLMNs which support CAMEL, and in countries without

20 CAMEL support, the USSD solution is used.

Furthermore, non-IN customers can also use UCB.

Another problem is interworking between a number of IN
25 services in an SCP. This problem is solved by the IN service UCB cleverly setting the Called Party Address (CdPA) and Calling Party Address (CgPA).

Brief description of the drawings

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In the text which follows, the invention will be explained with reference to exemplary embodiments, in which:.

35 Figure 1 shows the activation of the UCB service in the SCP,
Figure 2 shows how the call back connection according to the invention is set up, and

Figure 3 shows the interworking with a telecommunication network which does not support CAMEL.

Description of the preferred embodiments

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Figure 1 shows how the call back service UCB is triggered by an incoming USSD (Unstructured Supplementary Service Data) string which is transmitted by the roaming mobile radio subscriber via the mobile switching center MSC in the visited network VPLMN, A.

A USSD string is normally intended for the home location register HLR in which the subscriber is administered. Here, however, the "follow-me" (SR7) function available in Siemens HLRs is triggered by means of the USSD string header. On the one hand, it expands the USSD string by the MSISDN (Mobile Subscriber ISDN Number) of the subscriber (A party) and then forwards it to a service control point SCP which supports the call back service UCB (B).

The SCP starts the IN service UCB. This service, in turn, returns to the A party a USSD string which acknowledges the receipt, C, D.

The IN service UCB first sets up a connection to the A party by means of "Initiate Call Attempt" ICA, see Figure 2. Calling party CgPA is now the Called Party CdPA (B party) actually dialled and CdPA is the original CgPA (MSISDN of the A party); at the same time, all Event Detection Points EDP are armed with RequestReportBCSMEvent RRB, 21, and then the procedure continues with "Continue" CUE.

According to the GSM standard, a gateway mobile switching center GMSC interrogates the home location register HLR of the subscriber with SendRoutingInformation SRI, 22, 23. The connection to

the roaming party is set up via an IAM, 24. The service
UBC receives via EventReportBCSM ERB the information

whether the A party has answered (answer), is busy, is not answering (no_answer) or not available (not_reachable), 25.

5   In the case of the "answer", UCB responds with FurnishChargingInformation FCI so that an IN charges (AMA) ticket is written in the GMSC, and the operation "connect" CON which establishes the connection with the B party originally requested, 26.

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In all other events (busy, no_answer, not_reachable), the IN dialog is ended in an ordered manner with "ReleaseCall" RL. Apart from "answer", it is not absolutely necessary to set the flags of the EDPs: if,
15   for example, the "not_reachable" flag is not set, the SCP does not find out about this event. The GMSC releases the call by itself and the SCP responds in the same way if it does not receive any information within a certain time.

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Charging is ensured by the scenario: using "answer" by A, the GMSC generates a "roaming ticket" in which the answer time is entered. In the VMSC of the A party, an "MTC Ticket" is written and the SSP writes an "IN AMA
25   Ticket" due to the FCI operation.

Using "GetUserRecord", UCB decides whether and which IN service has been subscribed to by the A party. If the A party has no IN subscription, UCB acts as described
30   above.

If the A party has an IN subscription, UCB expands the CgPA in the InitiateCallAttempt ICA by an administerable number of administerable numbers XXX
35   which can also contain hexadecimal digits (in Figure 3, the subscribed IN service prepaid service is shown by way of example), 1. The subsequent interrogation of the HLR, 2 and 3, possibly supplies a T-CSI.

Since the MTC IN dialog is not wanted - the roaming A party actually wants to transmit a mobile originated call (MOC) - it must either be suppressed

by means of SDDPFC or in the EntryFSL or MTC (Mobile Terminated Call) service logic on the basis of the XXX code in the CgPA, 4 and 5. The second interrogation of the home location register HLR (second step in the two-

5   stage interrogation!) supplies the MSRN, 6 and 7, which provides for the connection to the A party, 8.

As soon as the A party answers, 9, the UCB is informed of this via ERB, 10. UCB then continues with the

10 "Connect" operation CON which, as calling party CgPA, contains the MSISDN of the A party and, as called party CdPA, the number of the B party originally dialled, expanded by an administerable number of administerable numbers YYY (hexadecimal digits are possible), 11.

15 Following YYY, a code point is to be set up at SSP which triggers the desired IN service at the "correct" SCP via an IDP (Initial Detection Point) (YYY must therefore be set up IN service-specifically).

20 Since the SCP has no information whatever about the A location of the A party, the service logic EntryFSL or the MOC IN service logic must determine the A location via the "AnyTimeInterrogation" ATI, 13. After that, the MOC service logic runs as if it had been started

25 directly via a CAP:IDP. In the case shown, PPS continues with "ApplyCharging" AC and "Connect" CON B party.

If the A party is not available (busy, no_answer,

30 not_reachable), the procedure described above can optionally be adopted.

List of abbreviations

AMA	Automatic Message Accounting
CAMEL	Customized Applications For Mobile Network Enhanced Logic (GSM 02.78)
CAP	CAMEL Application Part
CdPA	Called Party
CgPA	Calling Party
CON	Connect
CSI	CAMEL Subscriber Information
CUE	Continue
EDP	Event Detection Point
FCI	Furnish Charging Information
FSL	Flexible Service Logic
GMSC	Gateway Mobile Services Switching Center
GSM	Global System for Mobile Communication
HLR	Home Location Register
HPLMN	Home Public Land Mobile Network
ICA	InitiateCallAttempt
IN	Intelligent Network
MOC	Mobile Originated Call
MSC	Mobile Switching Center
MSISDN	Mobile Subscriber ISDN Number
MSRN	Mobile Station Roaming Number
MTC	Mobile Terminated Call
PPS	Prepaid Service
SCP	Service Control Point
SRI	Send Routing Information
VPLMN	Visited Public Land Mobile Network
UCB	USSD Call Back Service
USSD	Unstructured Supplementary Service Data